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This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claim 1 (currently amended): A multi-tone signal  
2 communications method for communicating information using  
3 N tones, where N is a positive integer greater than one,  
4 the method comprising:  
5 generating N analog signals, each one of the N  
6 analog signals corresponding to a different one of the N  
7 tones, wherein each of the N analog signals includes a  
8 periodic signal representing a symbol to be transmitted  
9 during said a symbol transmission period;  
10 separately generating N signal prefixes, one  
11 signal prefix being generated for each one of the N  
12 analog signals from the one of the N periodic signals  
13 included in the corresponding one of the N analog  
14 signals, each of the N signal prefixes including multiple  
15 parts and wherein the step of separately generating N  
16 signal prefixes includes, for each one of the N analog  
17 signals:  
18 i) generating a first cyclic prefix part from the  
19 included periodic signal representing the current symbol;  
20 and  
21 ii) generating a second prefix part from the  
22 included periodic signal representing the preceding  
23 symbol and from the first cyclic prefix part; and  
24 transmitting the N analog signals into a  
25 communications channel using M antennas, where M is an  
26 integer and where  $1 < M < N$ .

1 Claim 2 (original): The method of claim 1, wherein  $M=N$ .

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1 Claim 3 (original): The method of claim 1, further  
2 comprising the step of:  
3 separately amplifying each of the N analog  
4 signals prior to transmitting said N analog signals.

1 Claim 4 (currently amended): The method of claim 3,  
2 wherein each of said N analog signals has a duration  
3 corresponding to ~~at least a~~ said symbol transmission  
4 period.

1 Claim 5 (original): The method of claim 4, wherein the N  
2 periodic signals and signal prefixes are generated in the  
3 passband.

1 Claim 6 (currently amended): The method of claim 3 4,  
2 wherein each of the N analog signals has a duration  
3 corresponding to multiple symbol transmission periods.

1 Claim 7 (canceled)

1 Claim 8 (previously presented): The method of claim 1,  
2 wherein the step of generating a second prefix part  
3 includes cyclically extending the periodic signal  
4 representing the included preceding symbol and cyclically  
5 extending the first cyclic prefix part to correspond to  
6 the same time period; and  
7 combining and attenuating the cyclically  
8 extended portion of the first cyclic prefix part and the  
9 cyclically extended portion to the included periodic  
10 signal representing the preceding symbol.

1 Claim 9 (previously presented): A multi-tone signal  
2 communications method for communicating information using  
3 N tones, where N is a positive integer greater than one,  
4 the method comprising:

5 generating N analog signals, each one of the N  
6 analog signals corresponding to a different one of the N  
7 tones and wherein each of said N analog signals has a  
8 duration corresponding to at least a symbol transmission  
9 period and wherein each of the N analog signals includes  
10 a periodic signal representing a symbol to be transmitted  
11 during said symbol transmission period;

12 separately generating N signal prefixes, one  
13 signal prefix being generated for each one of the N  
14 analog signals from the one of the N periodic signals  
15 included in the corresponding one of the N analog  
16 signals;

17 separately amplifying each of the N analog  
18 signals prior to transmitting said N analog signals; and

19 transmitting the N analog signals into a  
20 communications channel using M antennas, where M is an  
21 integer and where  $1 < M \leq N$ ,

22 wherein each of the N signal prefixes includes  
23 multiple parts and wherein the step of separately  
24 generating N signal prefixes includes, for each one of  
25 the N analog signals:

26 generating a first cyclic prefix part from the  
27 included periodic signal representing the current symbol;  
28 and

29 generating a second prefix part to be a  
30 periodic signal, the beginning of the generated second

31 prefix part having the same phase as the end of the  
32 periodic signal representing the preceding symbol and the  
33 end of the generated second prefix part having the same  
34 phase as the beginning of the first cyclic prefix part.

1 Claim 10 (original): The method of claim 6, wherein each  
2 of the N periodic signals is a sinusoidal wave.

1 Claim 11 (original): The method of claim 6, wherein each  
2 of the N periodic signals is a square wave.

1 Claim 12 (previously presented): A multi-tone signal  
2 communications method for communicating information using  
3 N tones, where N is a positive integer greater than one,  
4 the method comprising:  
5       generating in parallel, for each one of the N  
6 tones, a separate periodic signal including at least one  
7 high order harmonic signal component that is different  
8 from the fundamental frequency signal component of said  
9 tone, wherein the generated periodic signal includes a  
10 square wave; and  
11       transmitting the generated N periodic signals  
12 into a communications channel.

1 Claim 13 (original): The method of claim 12, wherein the  
2 periodic signal generated for each of the N tones,  
3 includes multiple high order harmonic signal components.

1 Claim 14 (canceled)

1 Claim 15 (original): The method of claim 12, further  
2 comprising:  
3 generating, in parallel, for each one of the N  
4 tones, a separate periodic signal prefix.

1 Claim 16 (original): The method of claim 15, wherein the  
2 step of generating a separate periodic signal prefix for  
3 each one of the N tones includes, for each one of the N  
4 generated prefixes:  
5 generating a cyclic prefix portion; and  
6 generating a continuity signal portion, the  
7 continuity signal portion being generated as a function  
8 of a previously generated periodic signal and the current  
9 generated periodic signal.

1 Claim 17 (original): The method of claim 15, further  
2 comprising, for each one of the N tones, combining in the  
3 passband, the periodic signal corresponding to the one of  
4 the N tones with the corresponding one of the N periodic  
5 signal prefixes.

1 Claim 18 (previously presented): A multi-tone signal  
2 communications method for communicating information using  
3 at least N tones, where N is a positive integer greater  
4 than one, the method comprising:  
5 separately generating, for each one of the N  
6 tones, a passband periodic signal representing a symbol,  
7 at least some of the N generated passband periodic  
8 signals include a high order harmonic signal component in  
9 addition to a fundamental frequency signal component, the

10 high order harmonic signal component having a frequency  
11 which is higher than the frequency of the fundamental  
12 signal component; and  
13 transmitting the N generated passband periodic  
14 signals.

1 Claim 19 (original): The method of claim 18, wherein the  
2 passband periodic signals for each one of the N tones are  
3 generated in parallel; and  
4 wherein the step of transmitting the N  
5 generated passband periodic signals includes broadcasting  
6 different ones of said N passband periodic signals using  
7 different antennas.

1 Claim 20 (previously presented): The method of claim 18,  
2 further comprising:  
3 combining at least some of the N generated  
4 passband periodic signals prior to transmission.

1 Claim 21 (canceled)

1 Claim 22 (previously presented): The method of claim 18,  
2 wherein each of the N generated periodic signals is a  
3 square wave.

1 Claim 23 (original): The method of claim 18, further  
2 comprising:  
3 generating, a separate prefix for each of the N  
4 generated passband periodic signals; and

5 combining, prior to transmission, each one of  
6 the separate prefixes with the corresponding one of the N  
7 generated passband periodic signals.

1 Claim 24 (original): The method of claim 23, wherein the  
2 prefixes for each of the N passband periodic signals are  
3 generated in parallel.

1 Claim 25 (original): The method of claim 23, wherein the  
2 step of combining each one of the separate prefixes with  
3 the corresponding one of the N generated passband  
4 periodic signals includes:

5 prepending the generated prefix to the  
6 corresponding one of the N generated passband periodic  
7 signals.

1 Claim 26 (original): The method of claim 23, wherein  
2 generating a separate prefix for each of the N generated  
3 passband periodic signals includes, for each separate  
4 prefix:

5 generating a first cyclic prefix part; and  
6 generating a second prefix part, the second prefix  
7 part being generated using a different generation  
8 technique than the first prefix part.

1 Claim 27 (canceled):

1 Claim 28 (previously presented): A periodic signal  
2 processing method, the method comprising:

3           generating a multi-part prefix from a first  
4       periodic signal, the step of generating a multi-part  
5       prefix from the first periodic signal including:  
6           performing a cyclic extension operation on  
7       the first periodic signal to generate a cyclic  
8       prefix portion;  
9           processing the cyclic prefix portion to  
10      generate a continuity prefix portion from the  
11      cyclic prefix portion; and  
12           appending the cyclic prefix portion  
13      to the end of the continuity prefix portion;  
14      and  
15      communicating a signal including the generated  
16      multi-part prefix to a transmitter.

1       Claim 29 (previously presented): A periodic signal  
2       processing method, the method comprising:  
3           generating a multi-part prefix from a  
4       first periodic signal, the step of generating a  
5       multi-part prefix from the first periodic  
6       signal including:  
7           performing a cyclic extension  
8       operation on the first periodic signal to  
9       generate a cyclic prefix portion;  
10           processing a preceding periodic  
11      signal to generate a continuity prefix portion  
12      from the preceding periodic signal; and



13                   appending the cyclic prefix portion  
14                   to the end of the continuity prefix portion;  
15                   and  
16                   communicating a signal including the generated  
17                   multi-part prefix to a transmitter.

1       Claim 30 (previously presented): A periodic signal  
2       processing method, the method comprising:  
3                   generating a multi-part prefix from a first  
4       periodic signal, the step of generating a multi-part  
5       prefix from the first periodic signal including:  
6                   performing a cyclic extension  
7                   operation on the first periodic signal to  
8                   generate a cyclic prefix portion;  
9                   processing the cyclic prefix portion and a  
10                  preceding periodic signal to generate a  
11                  continuity prefix portion from both the cyclic  
12                  prefix portion and the preceding periodic  
13                  signal; and  
14                  appending the cyclic prefix portion to the  
15                  end of the continuity prefix portion; and  
16                  communicating a signal including the  
17       generated multi-part prefix to a transmitter.

1       Claim 31 (original): The method of claim 30, wherein  
2       said processing of the cyclic prefix portion and a  
3       preceding periodic signal includes:  
4                   performing a cyclic extension operation on the  
5       cyclic prefix portion to generate a first cyclic  
6       extension;

7 performing another cyclic extension operation  
8 on the preceding periodic signal to generate a second  
9 cyclic extension, the first and second cyclic extensions  
10 corresponding to a signal time period which is the same  
11 for both the first and second cyclic extensions; and  
12 combining the first and second cyclic  
13 extensions corresponding to said signal time period to  
14 generate said continuity prefix portion, the step of  
15 combining the first and second cyclic extensions  
16 including:  
17 windowing the combined cyclic extensions  
18 using an attenuating window.

1 Claim 32 (original): The method of claim 31, wherein  
2 each of said cyclic extension operations includes copying  
3 a portion of the signal upon which said cyclic extension  
4 operation is performed.

1 Claim 33 (previously presented): A periodic signal  
2 processing method, the method comprising:  
3 generating a multi-part prefix from a first  
4 periodic signal, the step of generating a multi-part  
5 prefix from the first periodic signal including:  
6 performing a cyclic extension  
7 operation on the first periodic signal to  
8 generate a cyclic prefix portion;  
9 generating a continuity prefix  
10 portion;

11                   appending the cyclic prefix portion  
12                   to the end of the continuity prefix portion;  
13                   and  
14                   wherein the continuity prefix portion has a  
15 frequency which is different from the frequency of the  
16 first periodic signal but has a phase at the point where  
17 the cyclic prefix portion is appended to the continuity  
18 prefix portion that is the same as the phase of the  
19 beginning of the cyclic prefix portion; and  
20                   communicating a signal including the generated  
21 multi-part prefix to a transmitter.

1    Claim 34 (previously presented): A periodic signal  
2    processing method, the method comprising:  
3                   generating a multi-part prefix from a first  
4    periodic signal, the step of generating a multi-part  
5    prefix from the first periodic signal including:  
6                   performing a cyclic extension  
7                   operation on the first periodic signal to  
8                   generate a cyclic prefix portion;  
9                   generating a continuity prefix  
10                  portion;  
11                  appending the cyclic prefix portion  
12                  to the end of the continuity prefix portion;  
13                  and  
14                  wherein the continuity prefix portion has a  
15 phase at the beginning of the continuity prefix portion  
16 that is the same as the phase of the end of a preceding  
17 periodic signal; and

18           communicating a signal including the generated  
19 multi-part prefix to a transmitter.

1       Claim 35 (previously presented): A periodic signal  
2 processing method, the method comprising:  
3           generating a multi-part prefix from a first  
4 periodic signal, the step of generating a multi-part  
5 prefix from the first periodic signal including:  
6                   performing a cyclic extension  
7           operation on the first periodic signal to  
8           generate a cyclic prefix portion;  
9                   generating a continuity prefix  
10          portion;  
11                   appending the cyclic prefix portion  
12          to the end of the continuity prefix portion;  
13          and  
14          wherein the first periodic signal is one of N  
15 period signals corresponding to N different tones of a  
16 multi-tone signal, where N is a positive integer greater  
17 than one, the method further including:  
18           generating for each of the N periodic signals,  
19 other than the first periodic signal, a separate multi-  
20 part prefix from a corresponding one of the N periodic  
21 signals, thereby generating N-1 multi-part signal  
22 prefixes in addition to the multi-part prefix generated  
23 from the first periodic signal; and  
24          communicating a signal including the generated  
25 multi-part prefix to a transmitter.

1 Claim 36 (original): The method of claim 35, further  
2 comprising:  
3 prepending each of the generated N-1 multi-part  
4 prefixes and the generated multi-part prefix generated  
5 from the first periodic signal to the corresponding ones  
6 of the N periodic signals from which the multi-part  
7 prefixes were generated.

1 Claim 37 (previously presented):  
2 A periodic signal processing method, the method  
3 comprising:  
4 generating a multi-part prefix from a first  
5 periodic signal, the step of generating a multi-part  
6 prefix from the first periodic signal including:  
7 performing a cyclic extension  
8 operation on the first periodic signal to  
9 generate a cyclic prefix portion;  
10 generating a continuity prefix  
11 portion;  
12 appending the cyclic prefix portion  
13 to the end of the continuity prefix portion;  
14 and  
15 wherein the first periodic signal is one of N  
16 period signals corresponding to N different tones of a  
17 multi-tone signal, where N is a positive integer greater  
18 than one, the method further including:  
19 generating for each of the N periodic signals,  
20 other than the first periodic signal, a separate multi-  
21 part prefix from a corresponding one of the N periodic  
22 signals, thereby generating N-1 multi-part signal

23 prefixes in addition to the multi-part prefix generated  
24 from the first periodic signal;  
25 prepending each of the generated N-1 multi-part  
26 prefixes and the generated multi-part prefix generated  
27 from the first periodic signal to the corresponding ones  
28 of the N periodic signals from which the multi-part  
29 prefixes were generated;  
30 filtering each of the N periodic signals with  
31 prepended multi-part prefixes in parallel; and  
32 transmitting the filtered N periodic signals  
33 with prepended multi-part prefixes into a communications  
34 channel.

1 Claim 38 (original): The method of claim 37, wherein the  
2 step of transmitting the filtered N periodic signals with  
3 prepended multi-part prefixes includes broadcasting  
4 different ones of the N periodic signals using different  
5 antennas.

1 Claim 39 (original): The method of claim 38, further  
2 comprising:  
3 allowing the N broadcast periodic signals to  
4 combine in the communications channel to form an N tone  
5 OFDM signal.

1 Claim 40 (canceled)

1 Claim 41 (previously presented): A method of  
2 sequentially transmitting symbols in a multi-tone signal  
3 communication system using N tones per symbol period,

4 wherein the N tones remain the same for multiple symbol  
5 periods, the time period in which the N tones remain the  
6 same being a dwell, the method comprising:

7 for each symbol transmission period of the  
8 dwell:

9 rotating a constellation of symbols from  
10 which consecutive symbols are transmitted using  
11 one of said N tones by a fixed amount and which  
12 is a function of the duration of a multi-part  
13 prefix to be transmitted and with the selected  
14 symbol, wherein said fixed amount by which the  
15 constellation of symbols is rotated is a  
16 function of the tone frequency used;

17 selecting a symbol to be transmitted from  
18 a constellation of symbols to be transmitted  
19 using a signal corresponding to one of said N  
20 tones; and

21 transmitting N signals corresponding to  
22 each one of the N tones of the multi-tone  
23 signal, each one of the N signals being  
24 transmitted on a corresponding one of a first  
25 plurality of antennas, the antenna being used  
26 to transmit signals corresponding to a  
27 particular tone during the dwell remaining the  
28 same throughout the dwell.

1 Claim 42 (original): The method of claim 41, further  
2 comprising the step of:  
3 for each symbol transmission period of a second  
4 dwell:

5 transmitting N signals corresponding to each one of  
6 the N tones of the multi-tone signal, each one of the N  
7 signals being transmitted on a corresponding one of a  
8 second plurality of antennas, the antenna being used to  
9 transmit signals corresponding to a particular tone  
10 during the second dwell remaining the same throughout the  
11 second dwell, the second plurality of antennas including  
12 at least one antenna which is different from the antennas  
13 included the first plurality of antennas.

1 Claim 43 (canceled)

1 Claim 44 (previously presented): The method of claim 41,  
2 wherein the rotation of the constellation during each of  
3 the plurality of symbol transmission period has a  
4 cumulative rotational effect on the constellation from  
5 which symbols are selected causing the rotation of the  
6 symbols in one symbol transmission period to effect the  
7 constellation from which symbols are selected during the  
8 next symbol transmission period.

1 Claim 45 (previously presented): The method of claim 41,  
2 wherein the rotation of the constellation during each of  
3 the plurality of symbol transmission periods is by a  
4 fixed additive amount which does not effect the position  
5 of the symbols in the constellation from which the next  
6 symbol is selected.

1 Claims 46-50 (canceled)



1 Claim 51 (previously presented): A system for generating  
2 and transmitting signals corresponding to an N tone  
3 multi-tone signal, where N is a positive integer greater  
4 than 1, the system comprising:

5 N periodic signal generator circuits for  
6 generating periodic signals, each periodic signal  
7 corresponding to a different tone one of the N tones of  
8 the multi-tone signal, wherein each of the N periodic  
9 signal generator circuits includes a square wave  
10 generator, each one of said N periodic signals including  
11 a square wave having a frequency component corresponding  
12 to one of said N tones of the multi-tone signal; and

13 N prefix generator circuits for independently  
14 generating periodic signal prefixes, each one of the N  
15 prefix generator circuits being coupled to a different  
16 corresponding one of the N periodic generator circuits.

1 Claim 52 (original): The system of claim 51, further  
2 comprising:

3 N filters for independently filtering the N  
4 periodic signals including prefixes generated by the N  
5 prefix generator circuits, each one of the N filters  
6 being coupled to a different corresponding one of the N  
7 prefix generator circuits.

1 Claim 53 (original): The system of claim 52, further  
2 comprising:

3 a plurality of M antennas, where M is an  
4 integer and where  $1 < M < N$ , each of the N filters being  
5 coupled to a single one of the M antennas and each one of

6 the M antennas being coupled to at least one of the N  
7 filters.

1 Claim 54 (original): The system of claim 53, wherein M =  
2 N.

1 Claim 55 (original): The system of claim 54, wherein M <  
2 N, the system further comprising, at least one analog  
3 combing circuit for combining signals from a subset of  
4 said N filters into a signal filter and for coupling each  
5 filter in the subset of said N filters one of said M  
6 antennas.

1 Claim 56 (canceled)

1 Claim 57 (original): The system of claim 51, wherein  
2 each of the N prefix generator circuits generates a  
3 separate prefix, each one of the N separate prefixes  
4 having the same duration.

1 Claims 58-60 (canceled)

1 Claim 61 (previously presented): A communications  
2 apparatus, comprising:  
3 a periodic signal generator module for  
4 generating a first periodic signal; and  
5 a prefix generation module for generating a  
6 multi-part prefix from a first periodic signal, the  
7 prefix generation module including:

8 means for performing a cyclic  
9 extension operation on the first periodic  
10 signal to generate a cyclic prefix  
11 portion;

12 means for processing the cyclic  
13 prefix portion to generate a continuity  
14 prefix portion from the cyclic prefix  
15 portion; and

16 means for appending the cyclic  
17 prefix portion to the end of the  
18 continuity prefix portion.

1 Claim 62 (previously presented): A communications  
2 apparatus, comprising:

3 a periodic signal generator module for  
4 generating a first periodic signal; and

5 a prefix generation module including:

6 means for generating a multi-  
7 part prefix from a first periodic signal  
8 by performing a cyclic extension operation  
9 on the first periodic signal to generate a  
10 cyclic prefix portion;

11 means for processing a preceding  
12 periodic signal to generate a continuity  
13 prefix portion from the preceding periodic  
14 signal; and

15 means for appending the cyclic  
16 prefix portion to the end of the  
17 continuity prefix portion.

1 Claim 63 (currently amended): A multi-tone signal  
2 communications apparatus for communicating information  
3 using N tones, where N is a positive integer greater than  
4 one, the apparatus comprising:

5 means for generating N analog signals, each one  
6 of the N analog signals corresponding to a different one  
7 of the N tones, wherein each of the N analog signals  
8 includes a periodic signal representing a symbol to be  
9 transmitted during ~~said~~ a symbol transmission period;

10 means for separately generating N signal  
11 prefixes, one signal prefix being generated for each one  
12 of the N analog signals from the one of the N periodic  
13 signals included in the corresponding one of the N analog  
14 signals, each of the N signal prefixes including multiple  
15 parts, said means for separately generating N signal  
16 prefixes including, for each one of the N analog signals:

17 i) means for generating a first  
18 cyclic prefix part from the included  
19 periodic signal representing the current  
20 symbol; and

21 ii) means for generating a second  
22 prefix part from the included periodic  
23 signal representing the preceding symbol  
24 and from the first cyclic prefix part; and

25 means for transmitting the N analog signals  
26 into a communications channel using M antennas, where M  
27 is an integer and where  $1 < M < N$ .

1 Claim 64 (previously presented): The apparatus of claim  
2 63, wherein  $M=N$ .

1 Claim 65 (previously presented): The apparatus of claim  
2 63, further comprising the step of:  
3 means for separately amplifying each of the N  
4 analog signals prior to transmitting said N analog  
5 signals.

1 Claim 66 (currently amended): The apparatus of claim 65,  
2 wherein each of said N analog signals has a duration  
3 corresponding to ~~at least a~~ said symbol transmission  
4 period.

Claim 67 (currently amended): A multi-tone signal  
communications apparatus for communicating information  
using N tones, where N is a positive integer greater than  
one, the apparatus comprising:

a processor configured to:

generate N analog signals, each one of the N  
analog signals corresponding to a different one of the N  
tones, wherein each of the N analog signals includes a  
periodic signal representing a symbol to be transmitted  
during ~~said a~~ a symbol transmission period;

separately generate N signal prefixes, one  
signal prefix being generated for each one of the N  
analog signals from the one of the N periodic signals  
included in the corresponding one of the N analog  
signals, each of the N signal prefixes including multiple  
parts, said separately generating N signal prefixes  
including, for each one of the N analog signals:

generating a first cyclic prefix part  
from the included periodic signal  
representing the current symbol; and  
generating a second prefix part from  
the included periodic signal representing  
the preceding symbol and from the first  
cyclic prefix part; and  
communicate the N analog signals to a  
transmitter for transmission into a communications  
channel using M antennas, where M is an integer and where  
 $1 < M < N$ .

1 Claim 68 (previously presented): A communications  
2 apparatus for communicating information using N tones,  
3 where N is a positive integer greater than one, the  
4 apparatus comprising:  
5 means for generating N analog signals, each one  
6 of the N analog signals corresponding to a different one  
7 of the N tones and wherein each of said N analog signals  
8 has a duration corresponding to at least a symbol  
9 transmission period and wherein each of the N analog  
10 signals includes a periodic signal representing a symbol  
11 to be transmitted during said symbol transmission period;  
12 means for separately generating N signal  
13 prefixes, one signal prefix being generated for each one  
14 of the N analog signals from the one of the N periodic  
15 signals included in the corresponding one of the N analog  
16 signals;

17 means for separately amplifying each of the N  
18 analog signals prior to transmitting said N analog  
19 signals; and  
20 means for transmitting the N analog signals  
21 into a communications channel using M antennas, where M  
22 is an integer and where  $1 < M \leq N$ ,  
23 wherein each of the N signal prefixes includes  
24 multiple parts and wherein the means for separately  
25 generating N signal prefixes includes, for each one of  
26 the N analog signals:  
27 means for generating a first cyclic  
28 prefix part from the included periodic signal  
29 representing the current symbol; and  
30 means for generating a second prefix  
31 part to be a periodic signal, the beginning of  
32 the generated second prefix part having the  
33 same phase as the end of the periodic signal  
34 representing the preceding symbol and the end  
35 of the generated second prefix part having the  
36 same phase as the beginning of the first cyclic  
37 prefix part.

1 Claim 69 (previously presented): The apparatus of claim  
2 68, wherein each of the N periodic signals is a  
3 sinusoidal wave.

1 Claim 70 (previously presented): The apparatus of claim  
2 68, wherein each of the N periodic signals is a square  
3 wave.

1 Claim 71 (previously presented): A multi-tone signal  
2 communications apparatus for communicating information  
3 using N tones, where N is a positive integer greater than  
4 one, the apparatus comprising:

5 a processor configured to:

6 generate N analog signals, each one of the N  
7 analog signals corresponding to a different one of the N  
8 tones and wherein each of said N analog signals has a  
9 duration corresponding to at least a symbol transmission  
10 period and wherein each of the N analog signals includes  
11 a periodic signal representing a symbol to be transmitted  
12 during said symbol transmission period;

13 separately generate N signal prefixes, one  
14 signal prefix being generated for each one of the N  
15 analog signals from the one of the N periodic signals  
16 included in the corresponding one of the N analog  
17 signals;

18 separately amplify each of the N analog signals  
19 prior to transmitting said N analog signals; and

20 communicate the N analog signals to M antennas  
21 for transmission into a communications channel, where M  
22 is an integer and where  $1 < M \leq N$ ,

23 wherein each of the N signal prefixes includes  
24 multiple parts; and

25 wherein the processor is configured to, as part of  
26 separately generating N signal prefixes:

27 generate a first cyclic prefix part  
28 from the included periodic signal representing  
29 the current symbol; and



30 generate a second prefix part to be a  
31 periodic signal, the beginning of the generated  
32 second prefix part having the same phase as the  
33 end of the periodic signal representing the  
34 preceding symbol and the end of the generated  
35 second prefix part having the same phase as the  
36 beginning of the first cyclic prefix part.

1 Claim 72 (previously presented): A multi-tone signal  
2 communications apparatus for communicating information  
3 using N tones, where N is a positive integer greater than  
4 one, the apparatus comprising:

5 means for generating in parallel, for each one  
6 of the N tones, a separate periodic signal including at  
7 least one high order harmonic signal component that is  
8 different from the fundamental frequency signal component  
9 of said tone, wherein the generated periodic signal  
10 includes a square wave; and

11 means for transmitting the generated N periodic  
12 signals into a communications channel.

1 Claim 73 (previously presented): The apparatus of claim  
2 72, wherein the periodic signal generated for each of the  
3 N tones, includes multiple high order harmonic signal  
4 components.

1 Claim 74 (previously presented): The apparatus of claim  
2 72, further comprising:

3 means for generating, in parallel, for each one  
4 of the N tones, a separate periodic signal prefix.

1 Claim 75 (previously presented): A multi-tone signal  
2 communications apparatus for communicating information  
3 using N tones, where N is a positive integer greater than  
4 one, the apparatus comprising:

5 a processor configured to:

6 generate in parallel, for each  
7 one of the N tones, a separate periodic  
8 signal including at least one high order  
9 harmonic signal component that is  
10 different from the fundamental frequency  
11 signal component of said tone, wherein the  
12 generated periodic signal includes a  
13 square wave; and

14 communicate the generated N  
15 periodic signals to a transmission device  
16 for transmission into a communications  
17 channel.

1 Claim 76 (previously presented): A computer readable  
2 medium embodying machine executable instructions for  
3 controlling a communications device to implement a method  
4 of communicating with another device using a multi-tone  
5 signal including N tones, where N is a positive integer  
6 greater than one, the method comprising:

7 generating in parallel, for each one  
8 of the N tones, a separate periodic signal  
9 including at least one high order harmonic  
10 signal component that is different from the  
11 fundamental frequency signal component of said

12 tone, wherein the generated periodic signal  
13 includes a square wave; and  
14 transmitting the generated N periodic  
15 signals into a communications channel.

1 Claim 77 (previously presented): A multi-tone signal  
2 communications apparatus for communicating information  
3 using at least N tones, where N is a positive integer  
4 greater than one, the method comprising:  
5 means for separately generating, for each one  
6 of the N tones, a passband periodic signal representing a  
7 symbol, at least some of the N generated passband  
8 periodic signals include a high order harmonic signal  
9 component in addition to a fundamental frequency signal  
10 component, the high order harmonic signal component  
11 having a frequency which is higher than the frequency of  
12 the fundamental signal component; and  
13 means for transmitting the N generated passband  
14 periodic signals.

1 Claim 78 (previously presented): The apparatus of claim  
2 77, wherein the passband periodic signals for each one of  
3 the N tones are generated in parallel; and  
4 wherein the means for transmitting the N  
5 generated passband periodic signals includes different  
6 antennas for broadcasting different ones of said N  
7 passband periodic signals.

1 Claim 79 (previously presented): The apparatus of claim  
2 77, comprising:

3 means for combining at least some of the N  
4 generated passband periodic signals prior to  
5 transmission.

1 Claim 80 (previously presented): A multi-tone signal  
2 communications apparatus for communicating information  
3 using at least N tones, where N is a positive integer  
4 greater than one, the apparatus comprising:

5 a processor configured to:

6 separately generate, for each  
7 one of the N tones, a passband periodic  
8 signal representing a symbol, at least  
9 some of the N generated passband periodic  
10 signals include a high order harmonic  
11 signal component in addition to a  
12 fundamental frequency signal component,  
13 the high order harmonic signal component  
14 having a frequency which is higher than  
15 the frequency of the fundamental signal  
16 component; and

17 communicate the N generated  
18 passband periodic signals to a  
19 transmission device for transmission into  
20 a communications channel.

1 Claim 81 (previously presented): A communications  
2 apparatus comprising:

3 means for generating a multi-part prefix from a  
4 first periodic signal, the means for generating a multi-  
5 part prefix from the first periodic signal including:

6 i) means for performing a cyclic  
7 extension operation on the first periodic  
8 signal to generate a cyclic prefix  
9 portion;  
10 ii) means for processing the cyclic  
11 prefix portion to generate a continuity  
12 prefix portion from the cyclic prefix  
13 portion; and  
14 iii) means for appending the cyclic  
15 prefix portion to the end of the  
16 continuity prefix portion; and  
17 means for communicating a signal including the  
18 generated multi-part prefix to a transmitter.

1 Claim 82 (previously presented): A communications  
2 apparatus comprising:  
3 a processor configured to:  
4 generate a multi-part prefix from a first  
5 periodic signal by:  
6 performing a cyclic extension operation on  
7 the first periodic signal to generate a  
8 cyclic prefix portion;  
9 processing the cyclic prefix portion to  
10 generate a continuity prefix portion from  
11 the cyclic prefix portion; and  
12 appending the cyclic prefix portion to the  
13 end of the continuity prefix portion; and  
14 communicate a signal including the generated  
15 multi-part prefix to a transmitter.

1 Claim 83 (previously presented): A communications  
2 apparatus, comprising:

3 means for generating a multi-part  
4 prefix from a first periodic signal, the step  
5 of generating a multi-part prefix from the  
6 first periodic signal including:

7 means for performing a cyclic  
8 extension operation on the first periodic  
9 signal to generate a cyclic prefix portion;

10 means for processing a preceding  
11 periodic signal to generate a continuity prefix  
12 portion from the preceding periodic signal; and

13 means for appending the cyclic prefix  
14 portion to the end of the continuity prefix  
15 portion; and

16 means for communicating a signal including the  
17 generated multi-part prefix to a transmitter.

1 Claim 84 (previously presented): A communications  
2 apparatus, comprising:

3 a processor configured to:

4 generate a multi-part prefix from a  
5 first periodic signal, generating a multi-part  
6 prefix from the first periodic signal  
7 including:

8 performing a cyclic  
9 extension operation on the first  
10 periodic signal to generate a cyclic  
11 prefix portion;

12                                   processing a preceding  
13                                   periodic signal to generate a  
14                                   continuity prefix portion from the  
15                                   preceding periodic signal; and  
16                                   appending the cyclic prefix  
17                                   portion to the end of the continuity  
18                                   prefix portion; and  
19                                   communicate a signal including the generated  
20                                   multi-part prefix to a transmitter.

1       Claim 85 (previously presented): A communications  
2       device, comprising:  
3                       means for generating a multi-part prefix from a  
4       first periodic signal, the means for generating a multi-  
5       part prefix from the first periodic signal including:  
6                       means for performing a cyclic  
7                       extension operation on the first periodic  
8                       signal to generate a cyclic prefix portion;  
9                       means for processing the cyclic  
10                      prefix portion and a preceding periodic signal  
11                      to generate a continuity prefix portion from  
12                      both the cyclic prefix portion and the  
13                      preceding periodic signal; and  
14                      means for appending the cyclic prefix  
15                      portion to the end of the continuity prefix  
16                      portion; and  
17                      means for communicating a signal including the  
18       generated multi-part prefix to a transmitter.

1 Claim 86 (previously presented): The apparatus of claim  
2 85, wherein said means for processing of the cyclic  
3 prefix portion and a preceding periodic signal includes:  
4 means for performing a cyclic extension  
5 operation on the cyclic prefix portion to generate a  
6 first cyclic extension;  
7 means for performing another cyclic extension  
8 operation on the preceding periodic signal to generate a  
9 second cyclic extension, the first and second cyclic  
10 extensions corresponding to a signal time period which is  
11 the same for both the first and second cyclic extensions;  
12 and  
13 means for combining the first and second cyclic  
14 extensions corresponding to said signal time period to  
15 generate said continuity prefix portion, the means for  
16 combining the first and second cyclic extensions  
17 including:  
18 means for windowing the combined cyclic  
19 extensions using an attenuating window.

1 Claim 87 (previously presented): The apparatus of claim  
2 86, wherein each of said means for performing cyclic  
3 extension operations includes means for copying a portion  
4 of the signal upon which said cyclic extension operation  
5 is performed.

1 Claim 88 (previously presented): A communications device,  
2 comprising:  
3 a processor configured to:



4                   generate a multi-part prefix from a first  
5       periodic signal, generating a multi-part prefix from the  
6       first periodic signal including:  
7                   performing a cyclic extension  
8                   operation on the first periodic signal to  
9                   generate a cyclic prefix portion;  
10                  processing the cyclic prefix  
11                  portion and a preceding periodic signal to  
12                  generate a continuity prefix portion from  
13                  both the cyclic prefix portion and the  
14                  preceding periodic signal; and  
15                  appending the cyclic prefix  
16                  portion to the end of the continuity  
17                  prefix portion; and  
18       communicate a signal including the generated  
19       multi-part prefix to a transmitter.

1       Claim 89 (currently amended): A first communications  
2       device, comprising:  
3                   means for generating a multi-part prefix from a  
4       first periodic signal, the means for generating a multi-  
5       part prefix from the first periodic signal including:  
6                   means for performing a cyclic  
7                   extension operation on the first periodic  
8                   signal to generate a cyclic prefix portion;  
9                   means for generating a continuity  
10                  prefix portion;

11 means for appending the cyclic prefix  
12 portion to the end of the continuity prefix  
13 portion; and  
14 wherein the continuity prefix portion has a  
15 frequency which is different from the frequency of the  
16 first periodic signal but has a phase at the point where  
17 the cyclic prefix portion is appended to the continuity  
18 prefix portion that is the same as the phase of the  
19 beginning of the cyclic prefix portion; and  
20 means for communicating a signal including the  
21 generated multi-part prefix to a second device.

1 Claim 90 (previously presented): A communications  
2 device, comprising:  
3 a processor configured to:  
4 generate a multi-part prefix from a first  
5 periodic signal, generating a multi-part prefix from the  
6 first periodic signal including:  
7 performing a cyclic extension  
8 operation on the first periodic signal to  
9 generate a cyclic prefix portion;  
10 generating a continuity prefix  
11 portion;  
12 appending the cyclic prefix  
13 portion to the end of the continuity  
14 prefix portion; and  
15 communicate a signal including the generated multi-  
16 part prefix to a second device; and  
17 wherein the continuity prefix portion has a  
18 frequency which is different from the frequency of the

19 first periodic signal but has a phase at the point where  
20 the cyclic prefix portion is appended to the continuity  
21 prefix portion that is the same as the phase of the  
22 beginning of the cyclic prefix portion.

1 Claim 91 (currently amended): A first communications  
2 device, comprising:

3 means for generating a multi-part prefix from a  
4 first periodic signal, the means for generating a multi-  
5 part prefix from the first periodic signal including:

6 means for performing a cyclic  
7 extension operation on the first periodic  
8 signal to generate a cyclic prefix portion;

9 means for generating a continuity  
10 prefix portion;

11 means for appending the cyclic prefix  
12 portion to the end of the continuity prefix  
13 portion; and

14 wherein the continuity prefix portion has a  
15 phase at the beginning of the continuity prefix portion  
16 that is the same as the phase of the end of a preceding  
17 periodic signal; and

18 means for communicating a signal including the  
19 generated multi-part prefix to a second device.

1 Claim 92 (previously presented): An apparatus for  
2 sequentially transmitting symbols in a multi-tone signal  
3 communication system using N tones per symbol period,  
4 wherein the N tones remain the same for multiple symbol

5 periods, the time period in which the N tones remain the  
6 same being a dwell, the apparatus comprising:

7 means for rotating a constellation of  
8 symbols from which consecutive symbols are  
9 transmitted using one of said N tones by a  
10 fixed amount and which is a function of the  
11 duration of a multi-part prefix to be  
12 transmitted and with the selected symbol,  
13 wherein said fixed amount by which the  
14 constellation of symbols is rotated is a  
15 function of the tone frequency used;

16 means for selecting a symbol to be  
17 transmitted from a constellation of symbols to  
18 be transmitted using a signal corresponding to  
19 one of said N tones; and

20 means for transmitting N signals  
21 corresponding to each one of the N tones of the  
22 multi-tone signal, each one of the N signals  
23 being transmitted on a corresponding one of a  
24 first plurality of antennas, the antenna being  
25 used to transmit signals corresponding to a  
26 particular tone during the dwell remaining the  
27 same throughout the dwell.

1 Claim 93 (previously presented): The apparatus of claim  
2 92, further comprising

3 means for transmitting N signals corresponding  
4 to each one of the N tones of the multi-tone signal, each  
5 one of the N signals being transmitted on a corresponding  
6 one of a second plurality of antennas, the antenna being

7 used to transmit signals corresponding to a particular  
8 tone during a second dwell remaining the same throughout  
9 second dwell, the second plurality of antennas including  
10 at least one antenna which is different from the antennas  
11 included the first plurality of antennas.

1 Claim 94 (previously presented): An apparatus for  
2 sequentially transmitting symbols in a multi-tone signal  
3 communication system using N tones per symbol period,  
4 wherein the N tones remain the same for multiple symbol  
5 periods, the time period in which the N tones remain the  
6 same being a dwell, the apparatus comprising:  
7 a processor configured to:  
8 rotate a constellation of symbols from  
9 which consecutive symbols are transmitted using  
10 one of said N tones by a fixed amount and which  
11 is a function of the duration of a multi-part  
12 prefix to be transmitted and with the selected  
13 symbol, wherein said fixed amount by which the  
14 constellation of symbols is rotated is a  
15 function of the tone frequency used;  
16 select a symbol to be transmitted from a  
17 constellation of symbols to be transmitted  
18 using a signal corresponding to one of said N  
19 tones; and  
20 communicate N signals corresponding to  
21 each one of the N tones of the multi-tone  
22 signal to a corresponding one of a first  
23 plurality of antennas, respectively, the  
24 antenna being used to transmit signals

25 corresponding to a particular tone during the  
26 dwell remaining the same throughout the dwell.

1 Claim 95 (previously presented): A system for generating  
2 and transmitting signals corresponding to an N tone  
3 multi-tone signal, where N is a positive integer greater  
4 than 1, the system comprising:

5 N periodic signal generator modules for  
6 generating periodic signals, each periodic signal  
7 corresponding to a different tone one of the N tones of  
8 the multi-tone signal, wherein each of the N periodic  
9 signal generator circuits includes a square wave  
10 generator, each one of said N periodic signals including  
11 a square wave having a frequency component corresponding  
12 to one of said N tones of the multi-tone signal; and

13 N prefix generator modules for independently  
14 generating periodic signal prefixes, each one of the N  
15 prefix generator modules being coupled to a different  
16 corresponding one of the N periodic generator modules.

1 Claim 96 (previously presented): The system of claim 95,  
2 further comprising:

3 N filter modules for independently filtering  
4 the N periodic signals including prefixes generated by  
5 the N prefix generator modules, each one of the N filters  
6 being coupled to a different corresponding one of the N  
7 prefix generator modules.